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CLAIMS

[Claim(s)]

[Claim 1] The upper substrate and lower substrate which are characterized by providing the following and which counter mutually and are arranged through liquid crystal, Two or more upper electrodes of the shape of a stripe formed in the liquid crystal of an above top substrate, and the field which counters in parallel by regular intervals, Two or more lower electrodes of the shape of a stripe which intersected the above top electrode group and was formed in the liquid crystal of the bottom substrate of the above, and the field which counters in parallel by regular intervals, The upper orientation film and lower orientation film which cover each of an above top electrode and the bottom electrode of the above, and carry out contact opposite with liquid crystal with a cell gap, It has at least the sealant which mixed the spacer which it is placed between circumference edges between an above top substrate and the bottom substrate of the above, and closes the above-mentioned liquid crystal with the above-mentioned cell gap between an above top substrate and the bottom substrate of the above. The liquid crystal display element equipped with the wiring section in which the wiring electrode which connects an above top electrode and the bottom electrode of the above to the terminal for external connection was formed around the above top substrate and the lower substrate, from the above-mentioned viewing area while forming the viewing area in the portion which an above top electrode and the bottom electrode of the above intersect. The upper dummy electrode in the upper wiring electrode and lower wiring electrode of the aforementioned wiring section so that it might counter in the wiring section electrode and **** same configuration of the bottom electrode of the above and might be prolonged to near the aforementioned viewing area while preparing the dummy electrode pair of a **** same configuration in each wiring section electrode of the aforementioned wiring section from each substrate inside and the aforementioned line part concerned in the position near [aforementioned] the viewing area. The lower dummy electrode prepared so that it might counter in the wiring section electrode and **** same configuration of an above top electrode and might be prolonged to near the aforementioned viewing area.

[Claim 2] The liquid crystal display element characterized by connecting electrically the electrode for wiring in which came to mix the electric conduction particle other than the aforementioned spacer for cell gap formation to the aforementioned sealant, and opposite arrangement was carried out by the above-mentioned electric conduction particle in the claim 1, the dummy electrode formed in the above top substrate, and the dummy electrode formed in the bottom substrate of the above.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention starts a liquid crystal display element, especially to change of a cell gap, especially its property is sensitive and it relates to the large-sized so-called STN dot matrix type liquid crystal display element as which the homogeneity in a screen is required further.

[0002]

[Description of the Prior Art] This kind of dot-matrix type liquid crystal display element The upper transparent-electrode group of the shape of a stripe formed in the field which contacts the liquid crystal of the upper glass substrate by which opposite arrangement was carried out through liquid crystal, a lower glass substrate, and an above top glass substrate in parallel by regular intervals, It intersects perpendicularly with the field contacted with the liquid crystal of the bottom glass substrate of the above at an above top transparent-electrode group. at equal intervals by and the thing for which voltage is impressed to each inter-electrode one which comes to have the lower transparent-electrode group of the shape of a stripe formed in parallel, and is arranged through liquid crystal The direction of orientation of the liquid crystal molecule of the above-mentioned intersection section is changed, and it displays as a dot.

[0003] in addition, it is discussed by "applied physics letter" 45, No.10, and 1021 and 1984 (J.Nehring : Applied Physics Letter, T.J.Scheffer, and "A new highly multiplexable liquidcrystal display"), concerning the drive technology of this kind of liquid crystal display element

[0004]

[Problem(s) to be Solved by the Invention] If the conventional liquid crystal display element which consists of the above-mentioned composition is not uniform, the gap, i.e., the cell gap, between the transparent electrodes formed in each of an upper substrate and a lower substrate, local nonuniformity will occur in a viewing area and it will reduce display quality to it.

[0005] As one means to cope with this problem, by Japanese Patent Application No. 4-52755 concerning application of these people, in order to raise cell gap homogeneity, originally the transparent electrode has adopted electrically the structure of preparing the transparent electrode of a dummy and preventing the heterogeneity of the cell gap by the thickness of the transparent electrode concerned also as the portion which is not required.

[0006] Drawing 6 is the ** type view of the important section flat surface explaining the composition of the above-mentioned conventional liquid crystal display element. 1 a lower substrate (lower glass substrate) and 3 for an upper substrate (upper glass substrate) and 2 An upper electrode (upper transparent electric conduction film), For the wiring section and 31, as for an upper electrode terminal and 41, an upper dummy electrode (upper dummy electric conduction film) and 32 are [the sealant from which 4 constitutes a lower electrode (lower transparent electric conduction film), and 8 constitutes the seal section, and 10 / a viewing area and 11 / a lower dummy electrode (lower dummy electric conduction film) and 42] lower electrode terminals.

[0007] Moreover, drawing 7 is the important section cross section cut along with the a-a line of drawing 6 , the same sign as drawing 6 corresponds to the same portion, and, for a match plate

and 51, as for a lower orientation film and 71, an upper orientation film and 52 are [6 / liquid crystal and 9 / the 1st spacer and 72] the 2nd spacer.

[0008] The upper orientation film 51 and the dummy electrode 21 with which the liquid crystal display element was covered by the inside of the upper substrate 1 the upper electrode (segment electrode) 3 and on this in drawing 6 and drawing 7 , The liquid crystal 6 which made the inside of the lower substrate 2 distribute the 1st spacer 71 between the lower electrode (common electrode) 4 and the lower orientation film 52 covered on this is pinched, and it comes to close in the seal section which mixed the 2nd spacer 72 to the periphery of the upper substrate 1 and the lower substrate 2 at the sealant 8.

[0009] The 2nd spacer 72 is arranged at the gap between the dummy electrodes 21 and the lower electrodes 4 of the lower substrate 2 by which the 1st spacer 71 was formed in the cell gap between the upper orientation film 51 formed in the upper substrate 1, and the lower orientation film 52 formed in the lower substrate 2 again at the upper substrate.

[0010] The above-mentioned dummy electrode 21 is installed in the periphery side rather than the match plate 9, and it has taken 2-3mm distance between [S] the sacrifice board 9 and the viewing area in order to usually eliminate the influence of the shadow of a sacrifice board with assembly position tolerance and thickness with the sacrifice board 9.

[0011] For this reason, in this portion S, each film composition of a liquid crystal display cell is not the same as that of the portion of a viewing area 10, and only its thick part of the upper electrode 3 is thin.

[0012] Usually, in order to prevent the gap swelling of the center section of the liquid crystal cell, the cell internal pressure after liquid crystal material enclosure is lower than atmospheric pressure, and is closed in the state of negative pressure.

[0013] Drawing 8 is the ** type view showing the state where the cell gap of the above-mentioned conventional liquid crystal display element changed with atmospheric pressure, the portion 13 without the upper electrode 3 serves as cell gap smallness, and in order that the influence of this cell gap smallness may reach to the rim section of a viewing area, the cell gap smallness of this viewing-area rim brings about the fall (threshold-voltage smallness) of a threshold voltage.

[0014] However, in spite of turning on only a viewing area if opposite arrangement of the dummy electrode is only carried out at the substrate of another side since electric field are added to one wiring section electrode with the natural thing Since there was a problem of switching on the light to the above-mentioned wiring section, the position which arranges a dummy electrode was restricted only to the portion outside a display effective field, and the portion which hides in the so-called sacrifice board at the time of mounting of a liquid crystal module among the seal sections which join the upper substrate 1 through liquid crystal 6.

[0015] The installation position of the above-mentioned dummy electrode is inadequate, in order to raise the homogeneity of a cell gap, since superficial distance is between viewing areas in addition, furthermore, on the periphery edge of a viewing area There was a problem that cell gap heterogeneity (gap smallness) tends to happen, the fall of the threshold voltage in the periphery marginal part of a viewing area occurred as a result, and the portion to which contrast falls [the periphery marginal part] in the shape of a frame compared with the center section of the viewing area occurred.

[0016] Moreover, the counterelectrode was more positively prepared in the display dot outside, although there was also a method of always impressing non-choosing voltage by the external circuit, the same non-choosing wave generating means and same connecting means as a display impression wave were needed, and there was un-arranging [of having become a cost rise]. The purpose of this invention is to offer the liquid crystal display element which canceled the cell gap heterogeneity by electrode thickness, and raised display quality, without avoiding the fault by preparing the above dummy electrodes to near the electrode of the display dot section, and requiring addition of external circuits, such as the above-mentioned non-choosing wave generating means.

[0017]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention

is always maintaining the transparent electric conduction film and the wiring section of the dummy concerned at this potential, and it is made for the above-mentioned wiring section not to turn it on superfluously by connecting the electrode of a dummy with the wiring section to which opposite arrangement of it is carried out, and electric field are impressed electrically.

[0018] Although there is conductivity in the thickness direction by mixing a conductive particle into a sealing compound as the above-mentioned electrical connecting means at a sealant, the composition which gave the anisotropy electric conduction function in which there is no conductivity is adopted in the direction of a flat surface.

[0019] Namely, the upper substrate 1 and the lower substrate 2 which this invention counters mutually through liquid crystal 6, and are arranged, Two or more upper electrodes 3 of the shape of a stripe formed in the liquid crystal of the above top substrate 1, and the field which counters in parallel by regular intervals, Two or more lower electrodes 4 of the shape of a stripe which intersected the above top electrode and was formed in the liquid crystal of the bottom substrate 2 of the above, and the field which counters in parallel by regular intervals, The upper orientation film 51 and the lower orientation film 52 which cover each of the above top electrode 3 and the bottom electrode 4 of the above, and carry out contact opposite with liquid crystal with a cell gap, It has at least the sealant 8 which mixed the spacer which it is placed between circumference edges between the above top substrate 1 and the bottom substrate 2 of the above, and closes the above-mentioned liquid crystal with the above-mentioned cell gap between an above top substrate and the bottom substrate of the above. In the liquid crystal display element equipped with the wiring section 11 in which the wiring electrode which connects an above top electrode and the bottom electrode of the above to the terminals 32 and 42 for external connection was formed around the above top substrate and the lower substrate, from the above-mentioned viewing area while forming the viewing area 10 in the portion which the above top electrode 3 and the bottom electrode 4 of the above intersect the upper wiring electrode and lower wiring electrode of the aforementioned wiring section 11 — the position near [each substrate inside and the aforementioned line part concerned to / aforementioned] the viewing area — each wiring section electrode of the aforementioned wiring section — the dummy electrode pair of a **** same configuration, while preparing 33 and 43 It counters in the wiring section electrode and **** same configuration of the bottom electrode of the above, counters in the upper dummy electrode 34 prepared so that it might be prolonged to near the aforementioned viewing area, the wiring section electrode of an above top electrode, and a **** same configuration, and is characterized by forming the lower dummy electrode 44 prepared so that it might be prolonged to near the aforementioned viewing area.

[0020] Moreover, it is characterized by connecting electrically the electrode for wiring in which came to mix the electric conduction particle 73 other than the aforementioned spacer 72 for cell gap formation to the aforementioned sealant 8, and opposite arrangement was carried out by the above-mentioned electric conduction particle 73, the dummy electrode 34 formed in the above top substrate, and the dummy electrode 44 formed in the bottom substrate of the above.

[0021]

[Function] In the composition of the above-mentioned this invention, in the seal section, since it connects with the opposite wiring section electrically and considers as both the same potentials, the dummy electrode which countered with the electrode of the wiring section and was prepared is not turned on independently, respectively.

[0022] Since a dummy electrode can be arranged to very near the viewing area of the match-plate inside and the whole liquid crystal display cell surface can be made into the same thickness as the portion of a viewing area by this, the whole liquid crystal display cell surface serves as a uniform cell gap (uniform liquid crystal thickness), and there is no generating of contrast unevenness [as / in the conventional technology].

[0023]

[Example] Hereafter, with reference to a drawing, it explains in detail about the example of this invention.

[0024] the important section plan with which drawing 1 explains one example of the liquid crystal display element by this invention — it is — 1 — an upper substrate and 2 — a lower substrate

and 3 — an upper electrode (segment electrode) and 4 — for the wiring section and 32, as for a dummy electrode pair and 34, the electrode terminal of an upper electrode, and 33 and 43 are [a lower electrode (common electrode) and 8 / a sealant and 11 / an upper dummy electrode and 44] lower dummy electrodes

[0025] moreover, the important section cross section which met the a-a line of drawing 1 by which drawing 2 explains one example of the liquid crystal display element by this invention — it is — the same sign as drawing 1 — the same portion — corresponding — 9 — for an upper orientation film and 52, as for the 1st spacer and 72, a lower orientation film and 71 are [a match plate and 10 / a viewing area and 51 / the 2nd spacer and 73] electric conduction particles

[0026] Many upper electrodes 3 of the shape of a stripe which this liquid crystal display element countered mutually through liquid crystal 6, and the upper substrate 1 and the lower substrate 2 have been arranged, and was formed in the liquid crystal of the above top substrate 1, and the field which counters in parallel by regular intervals in drawing 1 and drawing 2 . It has many lower electrodes 4 of the shape of a stripe which intersected the above top electrode and was formed in the liquid crystal of the bottom substrate 2 of the above, and the field which counters in parallel by regular intervals. Each of the above top electrode 3 and the bottom electrode 4 of the above is covered, contact opposite is carried out with liquid crystal with a cell gap, and the upper orientation film 51 and the lower orientation film 52 are formed.

[0027] Moreover, it is placed between a circumference edge between the above top substrate 1 and the bottom substrate 2 of the above, and the above-mentioned liquid crystal 6 is closed between the above top substrate and the bottom substrate of the above by the sealant 8 which mixed the spacer with the above-mentioned cell gap.

[0028] And while a viewing area 10 is formed in the portion which the above top electrode 3 and the bottom electrode 4 of the above intersect, it has the wiring section 11 which formed the upper wiring electrode 321 which connects the above top electrode 3 and the bottom electrode 4 of the above to the terminals 32 and 42 for external connection, respectively, and the lower wiring electrode 421 from the above-mentioned viewing area 10 around the above top substrate 1 and the lower substrate 2.

[0029] To the upper wiring electrode 321 and the lower wiring electrode 421 of this wiring section 11, in the position near the aforementioned viewing area 10 from the inside and the above-mentioned line part 11 of each substrate concerned 33 and 43 are prepared. each wiring section electrode 321,421 of the above-mentioned wiring section 11 — the dummy electrode pair of a **** same configuration — The upper dummy electrode 34 prepared so that it might furthermore counter in the wiring section electrode 421 and **** same configuration of the bottom electrode 2 of the above and might be prolonged to near the above-mentioned viewing area 10, It counters in the wiring section electrode 321 and **** same configuration of the above top electrode 3, and comes to prepare the lower dummy electrode 44 prepared so that it might be prolonged to near the aforementioned viewing area 10.

[0030] That is, the upper dummy electrode 34 which consists of a transparent electric conduction film of each wiring section electrode 321,421 and an abbreviation same configuration to which the segment electrode and the terminals 32 and 42 for external connection which consist of a transparent electric conduction film of a viewing area 10 are connected, and the lower dummy electrode 44 are formed in the substrate (the upper substrate 1, lower substrate 2) of the side which counters, respectively.

[0031] Moreover, this upper dummy electrode 34 and the lower dummy electrode 44 are formed [to / near the **** of a viewing area 10 / from the seal section which consists of a sealant 8], and have mixed the 2nd conductive spacer 72 which carried out plating formation of the conductive metal with the front face of the plastics bead of the same quality of the material as this 1st spacer 71 other than the 1st spacer 71 for cell gap formation currently distributed inside the liquid crystal cell at the seal section. The big thing of a mean particle diameter is used for this 2nd spacer 72 about about 15% from that of the 1st spacer 71 for cell gap formation, and the amount of mixtures to a sealant 8 is 2 about 100 pieces/mm. It is considering as the grade. [0032] By having considered as the above composition, the whole liquid crystal cell surface can

be made into uniform thickness, without making the wiring section turn on, and the unevenness of the contrast by the gap smallness of the rim section of the viewing area which was the conventional trouble can be abolished.

[0033] Next, the example of the liquid crystal display using the liquid crystal display element by this invention is explained.

[0034] Drawing 3 is an expansion perspective diagram explaining the whole liquid crystal display structure using the liquid crystal display element by this invention, the same sign as the example of the aforementioned liquid crystal display element corresponds to the same portion, and, for 60, as for a birefringence member and 62, a liquid crystal display element and 61 are [an upper polarizing plate and 63] lower polarizing plates.

[0035] In this drawing, the direction of rubbing of the upper orientation film 51 and the lower orientation film 52 is set up so that it may have the spiral structure to which the liquid crystal molecule was twisted between the upper substrates 1 and the lower substrates 2 which pinch liquid crystal 6.

[0036] The orientation films 51 and 52 grind the front face of organic macromolecule resin sheets, such as a polyimide, in the one direction with cloth etc., and orientation (carrying out rubbing) processing is carried out.

[0037] The direction of orientation of the upper orientation film 51 and the lower orientation film 52 crosses in 180 degrees – 360 degrees mutually, and opposite arrangement is carried out with the cell gap d. A sealant 8 has a liquid crystal inlet in the part, it pours in liquid crystal from this liquid crystal inlet in the crevice between each orientation films 51 and 52 of the upper electrode 1 and the lower electrode 2, and as described above, it is closed.

[0038] thus, the birefringence for phase compensation to the upper substrate top of the constituted liquid crystal display cell 60 — while a member 61 is allotted, the upper polarizing plate 62 and the lower polarizing plate 63 are formed in the upper and lower sides of this liquid crystal cell 60, and a liquid crystal display is constituted

[0039] Drawing 4 is the important section perspective diagram explaining the composition of the circumference of the upper substrate in the case of constituting electrochromatic display display using the liquid crystal display element by this invention fractured in part. 101 the Kamiaka electrode (red segment electrode) and 302 for an upper substrate and 301 An upper green electrode (green segment electrode), 303 — for a smooth layer and 513, as for a green filter and 515, a red filter and 514 are [an upper green electrode (blue segment electrode) and 511 / an upper orientation film and 512 / a blue filter and 516] shading films

[0040] In this drawing, when it constitutes the liquid crystal display of color display, while considering as the electrode 301,302,303 for the three-primary-colors drive of an upper electrode of red, green, and blue and preparing red, green, and a blue filter 513,514,515 and the blue shading film 516 in three primary colors corresponding to this, the smooth layer 512 for securing the smooth nature of the upper orientation film 511 is formed.

[0041] By forming the dummy electrode described above to the upper substrate of such structure, the whole liquid crystal cell surface can be made into uniform thickness, without making the wiring section turn on, and the unevenness of the contrast by the gap smallness of the rim section of the viewing area which was the conventional trouble can be abolished.

[0042] Drawing 5 is the expansion perspective diagram which assembled the liquid crystal display using the liquid crystal display element by this invention as a module, and, for a frame-like object and 64, as for a light guide plate and 66, a diffusion board and 65 are [the liquid crystal display element which explained 60 by aforementioned drawing 3 , the printed circuit board in which IC62 grade in which 61 drives a liquid crystal display element was carried, and 63 / a cold cathode-ray tube (back light) and 67] reflecting plates.

[0043] In this drawing, the liquid crystal display element 60 which fixed the printed circuit board 61 superimposes a frame-like object 63 and the front frame (match plate) 68, and is unified with the cold cathode-ray tube 66 prepared in the rear face, a light guide plate 65, a reflecting plate 67, and the diffusion board 64.

[0044] In such structure, it points to the light from the cold cathode-ray tube 66 in the direction of a liquid crystal display element with a reflecting plate 67, a light guide plate 65, and the

diffusion board 64, and it passes to a side front by torsion of the liquid crystal molecule which drove in IC62 grade and was formed in the viewing area of a liquid crystal cell. This reproduces a picture etc. to a liquid crystal display field.

[0045] This kind of liquid crystal display module is used as a picture output means of a personal computer, a word processor, and other information machines and equipment.

[0046]

[Effect of the Invention] The whole liquid crystal cell surface can be made into uniform thickness, without making this turn on according to this invention, as explained above, even if it arranges a dummy electrode in the wiring section of a liquid crystal display element, and the liquid crystal display element which avoids generating of the unevenness of the contrast by the gap smallness of the display dot outside edge which was the conventional trouble, and has the outstanding quality can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is an important section plan explaining one example of the liquid crystal display element by this invention.

[Drawing 2] It is the important section cross section which met the a-a line of drawing 1 explaining one example of the liquid crystal display element by this invention.

[Drawing 3] It is an expansion perspective diagram explaining the whole liquid crystal display structure using the liquid crystal display element by this invention.

[Drawing 4] It is the important section perspective diagram explaining the composition of the circumference of the upper substrate in the case of constituting electrochromatic display display using the liquid crystal display element by this invention fractured in part.

[Drawing 5] It is the expansion perspective diagram which assembled the liquid crystal display using the liquid crystal display element by this invention as a module.

[Drawing 6] It is the ** type view of the important section flat surface explaining the composition of the conventional liquid crystal display element.

[Drawing 7] It is the important section cross section cut along with the a-a line of drawing 6 explaining the composition of the conventional liquid crystal display element.

[Drawing 8] The cell gap of the conventional liquid crystal display element is the ** type view showing the state where it changed with atmospheric pressure.

[Description of Notations]

1 Upper Substrate

2 Lower Substrate

3 Upper Electrode (Segment Electrode)

4 Lower Electrode (Common Electrode)

8 Sealant

9 Match Plate

10 Viewing Area

11 Wiring Section

31 Upper Dummy Electrode

32 Upper Electrode Terminal

33 43 Dummy electrode pair

34 Upper Dummy Electrode

44 Lower Dummy Electrode

51 Upper Orientation Film

52 Lower Orientation Film

71 1st Spacer

72 2nd Spacer

73 Electric conduction particle.

[Translation done.]

PATENT ABSTRACTS OF JAPAN

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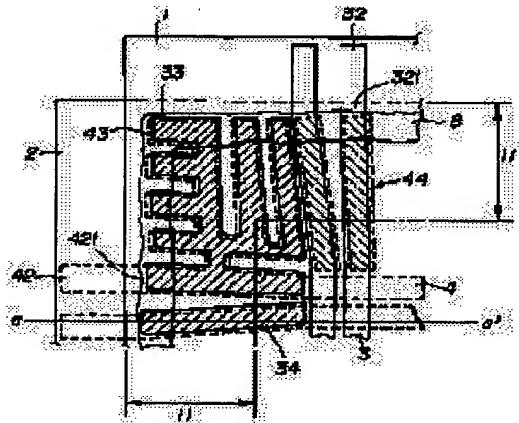
(21)Application number : 05-002628 (71)Applicant : HITACHI LTD
(22)Date of filing : 11.01.1993 (72)Inventor : HOSHINO NOBORU

(54) LIQUID CRYSTAL DISPLAY ELEMENT

(57)Abstract:

PURPOSE: To make the cell gap even over the whole surface of a liquid crystal cell to eliminate the lighting at a wiring part and the unevenness of contrast.

CONSTITUTION: A pair of dummy electrodes 33, 34 are also provided at a wiring part 11 of a display area 10, and dummy electrodes 34, 44 respectively having the nearly same shape with the shape of dummy electrodes 34, 44 are provided in wiring electrodes 321, 421 near each electrode of the display area 10, and these dummy electrodes 34, 44 are electrically connected to each other at a seal part. Consequently, the dummy electrodes 34, 44, which are provided in an upper and a lower substrates, have the same electric potential to eliminate the lighting at the wiring part, and the cell gap is evened over the whole surface to improve the contrast.



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(71)出願人 000005108

株式会社日立製作所

東京都千代田区神田駿河台四丁目 6 番地

(72)発明者 星野 登

千葉県茂原市早野3300番地
製作所電子デバイス事業部内

(74)代理人 奉理十 武 顯次郎

(54)【発明の名称】 液晶表示素子

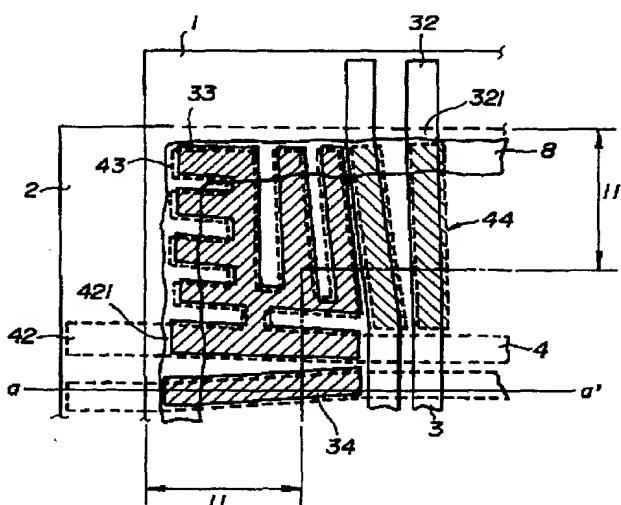
(57) 【要約】

【目的】 液晶セル全面のセルギャップを均一として配線部点灯やコントラストのむらを無くす。

【構成】 表示領域 10 の配線部 11 にもダミー電極対 33, 34 を設けると共に、配線ぶ配線 321, 421 に略々 同形状のダミー電極 34, 44 を表示領域 10 の各電極近傍まで設け、これらダミー電極をシール部において電気的に接続する。

【効果】 上下基板に設けたダミー電極が電気的に同電位となることにより、配線部が点灯することがなく、セルギヤップが全面において均一となり、コントラストが向上される。

1



(2)

2

【特許請求の範囲】

【請求項1】液晶を介して互いに対向して配置される上基板および下基板と、上記上基板の液晶と対向する面に等間隔でかつ平行に形成されたストライプ状の複数の上電極と、上記下基板の液晶と対向する面に上記上電極群と交叉して等間隔でかつ平行に形成されたストライプ状の複数の下電極と、上記上電極と上記下電極のそれぞれを覆ってセルギャップを持って液晶と当接対向する上配向膜および下配向膜と、上記上基板と上記下基板の間に周辺端部に介在して上記上基板と上記下基板の間に上記液晶を上記セルギャップをもって封止するスペーサを混合したシール材とを少なくとも有し、上記上電極と上記下電極の交叉する部分に表示領域を形成すると共に上記表示領域から上記上基板と下基板の周辺に上記上電極と上記下電極を外部接続用端子に接続する配線電極を形成した配線部とを備えた液晶表示素子において、前記配線部の上配線電極と下配線電極に、当該各基板内面と前記線部から前記表示領域近傍の位置に、前記配線部の各配線部電極に略々同一形状のダミー電極対を設けると共に、前記下電極の配線部電極と略々同一形状で対向し、前記表示領域の近傍まで延びるごとく設けた上ダミー電極と、前記上電極の配線部電極と略々同一形状で対向し、前記表示領域の近傍まで延びるごとく設けた下ダミー電極とを設けたことを特徴とする液晶表示素子。

【請求項2】請求項1において、前記シール材に前記セルギャップ形成用スペーサの他に導電粒子を混合してなり、上記導電粒子により対向配置された配線用電極と前記上基板に形成したダミー電極と前記下基板に形成したダミー電極とを電気的に接続したことを特徴とする液晶表示素子。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、液晶表示素子にかかり、特にセルギャップの変動に対して特性が特に敏感で、さらに画面内均一性が要求される大形の、所謂STNドットマトリック型の液晶表示素子に関する。

【0002】

【従来の技術】この種のドットマトリックス型液晶表示素子は、液晶を介して互いに対向配置された上ガラス基板と下ガラス基板、上記上ガラス基板の液晶と当接する面に等間隔でかつ平行に形成されたストライプ状の上透明電極群と、上記下ガラス基板の液晶と当接される面に上記上透明電極群に直交して等間隔にかつ平行に形成されたストライプ状の下透明電極群とを備えてなり、液晶を介して配置される各電極間に電圧を印加することで、上記交叉部の液晶分子の配向方向を変化させてドットとして表示するものである。

【0003】なお、この種の液晶表示素子の駆動技術に関しては、例えば「アプライド・フィジックス・レターナー」45, No. 10, 1021, 1984 (Applied

Physics Letter, T. J. Scheffer, J. Nehring : "A new highly multiplexable liquidcrystal display") に論じられている。

【0004】

【発明が解決しようとする課題】上記の構成からなる従来の液晶表示素子は、上基板と下基板のそれぞれに形成された透明電極間の間隙、すなわちセルギャップが均一でないと表示領域に局所的なムラが発生し、表示品質を低下させてしまう。

【0005】この問題に対処する1手段として、本出願人の出願にかかる特願昭4-52755では、セルギャップ均一性を向上させるために、本来、電気的に透明電極が必要でない部分にも、ダミーの透明電極を設けて当該透明電極の厚さによるセルギャップの不均一性を防止する構造を採用している。

【0006】図6は上記従来の液晶表示素子の構成を説明する要部平面の模式図であって、1は上基板（上ガラス基板）、2は下基板（下ガラス基板）、3は上電極（上透明導電膜）、4は下電極（下透明導電膜）、8はシール部を構成するシール材、10は表示領域、11は配線部、31は上ダミー電極（上ダミー導電膜）、32は上電極端子、41は下ダミー電極（下ダミー導電膜）、42は下電極端子である。

【0007】また、図7は図6のa-a線に沿って切断した要部断面図であって、図6と同一符号は同一部分に対応し、6は液晶、9は見切り板、51は上配向膜、52は下配向膜、71は第1のスペーサ、72は第2のスペーサである。

【0008】図6、図7において、液晶表示素子は上基板1の内面に上電極（セグメント電極）3とこの上に被覆された上配向膜51およびダミー電極21と、下基板2の内面に下電極（コモン電極）4とこの上に被覆された下配向膜52との間に第1のスペーサ71を分散させた液晶6を挟持し、上基板1と下基板2の周辺部にシール材8に第2のスペーサ72を混合したシール部で封止してなる。

【0009】上基板1に形成された上配向膜51と下基板2に形成された下配向膜52との間のセルギャップに第1のスペーサ71が、また上基板に形成されたダミー電極21と下基板2の下電極4との間のギャップには第2のスペーサ72が配置されている。

【0010】上記ダミー電極21は見切り板9よりも外周側に設置されており、通常、見切板9との組み立て位置裕度および厚みを持つ見切板の影の影響を排除するため、見切板9と表示領域との間Sには2~3mmの距離を取っている。

【0011】このため、この部分Sでは、液晶表示セルの各膜構成は表示領域10の部分と同一でなく、上電極3の厚分だけ薄い。

【0012】通常、液晶セルの中央部のギャップ膨みを

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防ぐため、液晶材封入後のセル内圧は、大気圧より低く、負圧の状態で封止されている。

【0013】図8は上記従来の液晶表示素子のセルギャップが大気圧で変化した状態を示す模式図であって、上電極3の無い部分13は、セルギャップ小となり、このセルギャップ小の影響は表示領域の外縁部までおよぶため、この表示領域外縁のセルギャップ小が閾値電圧の低下（閾値電圧小）をもたらす。

【0014】しかし、一方の配線部電極には当然のことながら、電界が加えられているため、単にダミー電極を他方の基板に対向配置すると、表示領域しか点灯してはならないのにもかかわらず、上記配線部まで点灯してしまうという問題があるため、ダミー電極を配設する位置は、上基板1を液晶6を介して接合するシール部の内か、または、液晶モジュールの実装時に表示有効領域よりも外側の部分、所謂見切板に隠れる部分のみに限られていた。

【0015】さらに、上記のダミー電極の設置位置では、なお表示領域との間に平面的距離があるため、セルギャップの均一性を向上させるためには不充分であり、表示領域の外周縁で、セルギャップ不均一性（ギャップ小）が起り易く、結果的に表示領域の外周縁部での閾値電圧の低下が発生し、表示領域の中央部に比べてその外周縁部が額縁状にコントラストの低下する部分が発生するという問題があった。

【0016】また、より積極的に表示ドット部外に対向電極を設けて、外部回路により非選択電圧を常時印加するという方法もあるが、表示部印加波形と同様の非選択波形発生手段及び接続手段が必要となりコストアップとなるという不都合があった。本発明の目的は、上記のようなダミー電極を表示ドット部の電極近傍まで設けることによる不具合を回避し、また、上記非選択波形発生手段等の外部回路の付加を要することなく電極厚さによるセルギャップ不均一性を解消して表示品質を向上させた液晶表示素子を提供することにある。

【0017】

【課題を解決するための手段】上記目的を達成するため、本発明は、ダミーの電極を、それが対向配置されて電界が印加されている配線部と電気的に接続することにより、当該ダミーの透明導電膜と配線部とを常に同電位に保つことで、上記配線部が不必要に点灯することができないようにしたものである。

【0018】上記電気的接続手段としては、シール剤中に導電性粒子を混ぜることによりシール材に厚さ方向には導電性があるが平面方向には導電性がないという異方向性導電機能を持たせた構成を採用するものである。

【0019】すなわち、本発明は、液晶6を介して互いに対向して配置される上基板1および下基板2と、上記上基板1の液晶と対向する面に等間隔でかつ平行に形成されたストライプ状の複数の上電極3と、上記下基板2

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の液晶と対向する面に上記上電極と交叉して等間隔でかつ平行に形成されたストライプ状の複数の下電極4と、上記上電極3と上記下電極4のそれぞれを覆ってセルギャップを持って液晶と当接対向する上配向膜51および下配向膜52と、上記上基板1と上記下基板2の間に周辺端部に介在して上記上基板と上記下基板の間に上記液晶を上記セルギャップをもって封止するスペーサを混合したシール材8とを少なくとも有し、上記上電極3と上記下電極4の交叉する部分に表示領域10を形成すると共に上記表示領域から上記上基板と下基板の周辺に上記上電極と上記下電極を外部接続用端子32、42に接続する配線電極を形成した配線部11とを備えた液晶表示素子において、前記配線部11の上配線電極と下配線電極に、当該各基板内面と前記表示領域から前記表示領域近傍の位置に、前記配線部の各配線部電極に略々同一形状のダミー電極対33、43を設けると共に、前記下電極の配線部電極と略々同一形状で対向し、前記表示領域の近傍まで延びるごとく設けた上ダミー電極34と、前記上電極の配線部電極と略々同一形状で対向し、前記表示領域の近傍まで延びるごとく設けた下ダミー電極44とを設けたことを特徴とする。

【0020】また、前記シール材8に前記セルギャップ形成用スペーサ72の他に導電粒子73を混合してなり、上記導電粒子73により対向配置された配線用電極と前記上基板に形成したダミー電極34と前記下基板に形成したダミー電極44とを電気的に接続したことを特徴とする。

【0021】

【作用】上記本発明の構成において、それぞれ独立して、配線部の電極と対向して設けられたダミー電極は、シール部において、その対向配線部と電気的に接続されて、共に同一電位とされるために点灯することができない。

【0022】これにより、ダミー電極を見切り板内側の表示領域のすぐ近くまで配設することができ、液晶表示セル全面を表示領域の部分と同じ厚さとすることができるために、液晶表示セル全面が均一なセルギャップ（均一な液晶層厚）となり、従来技術におけるようなコントラストむらの発生がない。

【0023】

【実施例】以下、本発明の実施例につき、図面を参照して詳細に説明する。

【0024】図1は本発明による液晶表示素子の一実施例を説明する要部平面図であって、1は上基板、2は下基板、3は上電極（セグメント電極）、4は下電極（コモン電極）、8はシール材、11は配線部、32は上電極の電極端子、33、43はダミー電極対、34は上ダミー電極、44は下ダミー電極である。

【0025】また、図2は本発明による液晶表示素子の一実施例を説明する図1のa-a線に沿った要部断面図であって、図1と同一符号は同一部分に対応し、9は見

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切り板、10は表示領域、51は上配向膜、52は下配向膜、71は第1のスペーサ、72は第2のスペーサ、73は導電粒子である。

【0026】図1、図2において、この液晶表示素子は液晶6を介して互いに対向して上基板1および下基板2とが配置され、上記上基板1の液晶と対向する面に等間隔でかつ平行に形成されたストライプ状の多数の上電極3と、上記下基板2の液晶と対向する面に上記上電極と交叉して等間隔でかつ平行に形成されたストライプ状の多数の下電極4とを有し、上記上電極3と上記下電極4のそれぞれを覆ってセルギャップを持って液晶と当接対向して上配向膜51および下配向膜52とが設けられている。

【0027】また、上記上基板1と上記下基板2の間に周辺端部に介在して上記上基板と上記下基板の間に上記液晶6を上記セルギャップをもってスペーサを混合したシール材8で封止されている。

【0028】そして、上記上電極3と上記下電極4の交叉する部分に表示領域10が形成されると共に、上記表示領域10から上記上基板1と下基板2の周辺に上記上電極3と上記下電極4を外部接続用端子32、42にそれぞれ接続する上配線電極321と下配線電極421を形成した配線部11とを備えている。

【0029】この配線部11の上配線電極321と下配線電極421に、当該各基板の内面と上記線部11から前記表示領域10の近傍の位置に、上記配線部11の各配線部電極321、421に略々同一形状のダミー電極対33、43を設け、さらに上記下電極2の配線部電極421と略々同一形状で対向し、上記表示領域10の近傍まで延びるごとく設けた上ダミー電極34と、上記上電極3の配線部電極321と略々同一形状で対向し、前記表示領域10の近傍まで延びるごとく設けた下ダミー電極44とを設けてなる。

【0030】すなわち、表示領域10の透明導電膜からなるセグメント電極と外部接続用端子32、42を結ぶそれぞれの配線部電極321、421と略々同一形状の透明導電膜からなる上ダミー電極34と下ダミー電極44をそれぞれ対向する側の基板（上基板1、下基板2）に設けている。

【0031】また、この上ダミー電極34と下ダミー電極44は、シール材8からなるシール部から表示領域10の極く近くまで形成されており、シール部には液晶セル内部に分散されているセルギャップ形成用の第1のスペーサ71の他に、この第1のスペーサ71と同一材質のプラスチックビーズの表面に導電性金属をメッキ形成した導電性の第2スペーサ72を混ぜてある。この第2スペーサ72は、セルギャップ形成用の第1のスペーサ71のそれより約15%程度平均粒径の大きなものを用い、シール材8への混合量は約100ケ/mm²程度としている。

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【0032】上記の様な構成したことにより、配線部を点灯させることなく液晶セル全面を均一な厚みとすることができ、従来の問題点であった表示領域の外縁部のギャップ小によるコントラストのむらを無くすることができる。

【0033】次に、本発明による液晶表示素子を用いた液晶表示装置の実施例について説明する。

【0034】図3は本発明による液晶表示素子を用いた液晶表示装置の全体構造を説明する展開斜視図であつて、前記液晶表示素子の実施例と同一符号は同一部分に対応し、60は液晶表示素子、61は複屈折部材、62は上偏光板、63は下偏光板である。

【0035】同図において、液晶6を挟持する上基板1と下基板2との間で液晶分子がねじれた螺旋構造を有するように上配向膜51と下配向膜52のラビング方向が設定されている。

【0036】配向膜51、52は、例えばポリイミドなどの有機高分子樹脂シートの表面を布などで1方向に擦って（ラビングして）配向処理される。

【0037】上配向膜51と下配向膜52の配向方向は、互いに180°～360°の範囲で交叉され、セルギャップdをもって対向配置される。シール材8は、その一部に液晶注入口を有し、この液晶注入口から上電極1と下電極2の各配向膜51と52の隙間に液晶を注入し、前記したように封止される。

【0038】このように構成された液晶表示セル60の上基板上に位相補償用の複屈折部材61が配されると共に、この液晶セル60の上下に上偏光板62と下偏光板63とが設けられて液晶表示装置が構成される。

【0039】図4は本発明による液晶表示素子を用いてカラー液晶表示装置を構成する場合の上基板まわりの構成を説明する一部破断した要部斜視図であつて、101は上基板、301は上赤電極（赤セグメント電極）、302は上緑電極（緑セグメント電極）、303は上青電極（青セグメント電極）、511は上配向膜、512は平滑層、513は赤フィルタ、514は緑フィルタ、515は青フィルタ、516は遮光膜である。

【0040】同図において、カラー表示の液晶表示装置を構成する場合は、上電極を赤、緑、青の3原色駆動のための電極301、302、303とし、これに対応して赤、緑、青の3原色のフィルタ513、514、515と遮光膜516を設けると共に、上配向膜511の平滑性を確保するための平滑層512を設ける。

【0041】このような構造の上基板に前記したダミー電極を形成することにより、配線部を点灯させることなく液晶セル全面を均一な厚みと/orすることができ、従来の問題点であった表示領域の外縁部のギャップ小によるコントラストのむらを無くすることができる。

【0042】図5は本発明による液晶表示素子を用いた液晶表示装置をモジュールとして組み立てた展開斜視図

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であって、60は前記図3で説明した液晶表示素子、61は液晶表示素子を駆動するIC62等を搭載したプリント基板、63は枠状体、64は拡散板、65は導光板、66は冷陰極線管(バックライト)、67は反射板である。

【0043】同図において、プリント基板61を固定した液晶表示素子60は枠状体63と表枠(見切り板)68とを重複し、裏面に設けた冷陰極線管66と導光板65、反射板67および拡散板64と共に一体化される。

【0044】このような構造において、冷陰極線管66からの光は反射板67、導光板65および拡散板64で液晶表示素子方向に指向し、IC62等で駆動されて液晶セルの表示領域に形成された液晶分子のねじれで表側に通過する。これにより、液晶表示領域に画像等を再生する。

【0045】この種の液晶表示モジュールは、パーソナルコンピュータやワープロ、その他の情報機器の画像出力手段として用いられる。

【0046】

【発明の効果】以上説明したように、本発明によれば、液晶表示素子の配線部にダミー電極を配置しても、これを点灯させることなく液晶セル全面を均一な厚みとすることができ、従来の問題点であった表示ドット部外縁部のギャップ小によるコントラストのむらの発生を回避し、優れた品質をもつ液晶表示素子を提供することができる。

【図面の簡単な説明】

【図1】本発明による液晶表示素子の一実施例を説明する要部平面図である。

【図2】本発明による液晶表示素子の一実施例を説明する図1のa-a線に沿った要部断面図である。

【図3】本発明による液晶表示素子を用いた液晶表示装

置の全体構造を説明する展開斜視図である。

【図4】本発明による液晶表示素子を用いてカラーライズ表示装置を構成する場合の上基板まわりの構成を説明する一部破断した要部斜視図である。

【図5】本発明による液晶表示素子を用いた液晶表示装置をモジュールとして組み立てた展開斜視図である。

【図6】従来の液晶表示素子の構成を説明する要部平面の模式図である。

【図7】従来の液晶表示素子の構成を説明する図6のa-a線に沿って切断した要部断面図である。

【図8】従来の液晶表示素子のセルギャップが大気圧で変化した状態を示す模式図である。

【符号の説明】

- 1 上基板
- 2 下基板
- 3 上電極(セグメント電極)
- 4 下電極(コモン電極)
- 8 シール材
- 9 見切り板
- 10 表示領域
- 11 配線部
- 31 上ダミー電極
- 32 上電極端子
- 33, 43 ダミー電極対
- 34 上ダミー電極
- 44 下ダミー電極
- 51 上配向膜
- 52 下配向膜
- 71 第1のスペーサ
- 72 第2のスペーサ
- 73 導電粒子。

【図2】

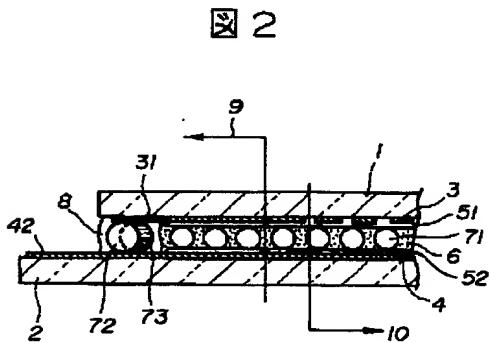
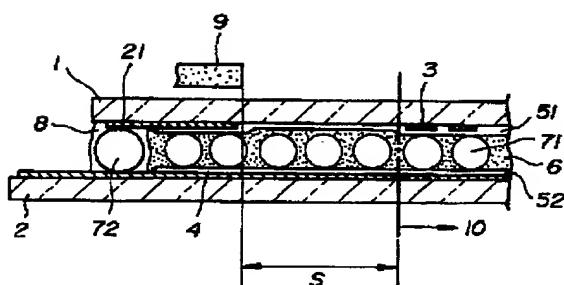


図2

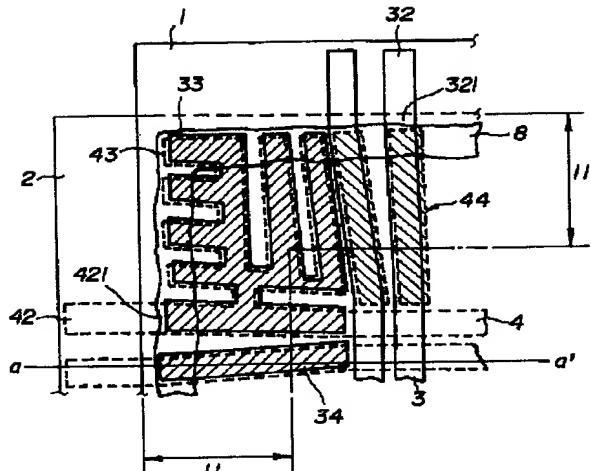
【図7】



(6)

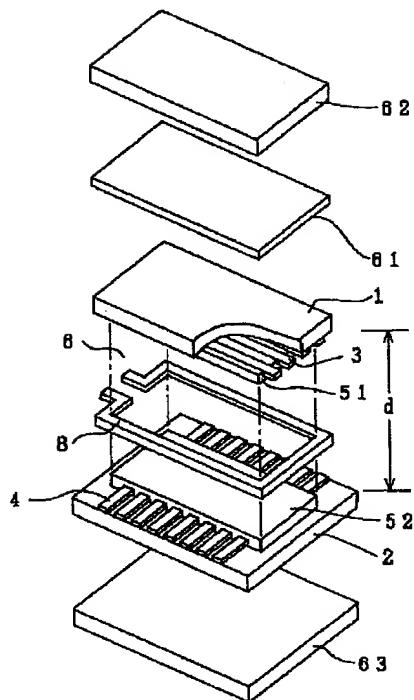
【図1】

図1



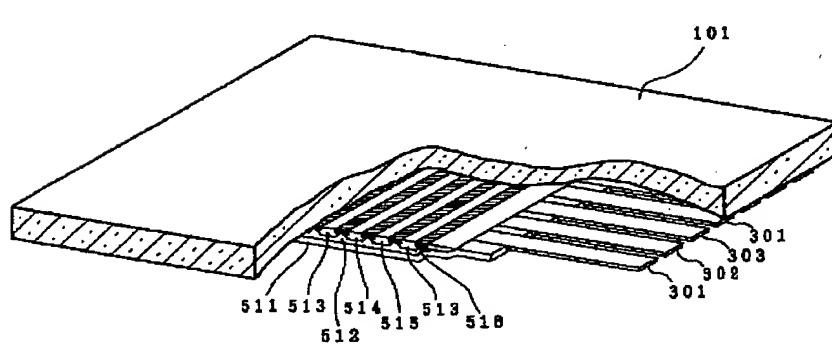
【図3】

図3



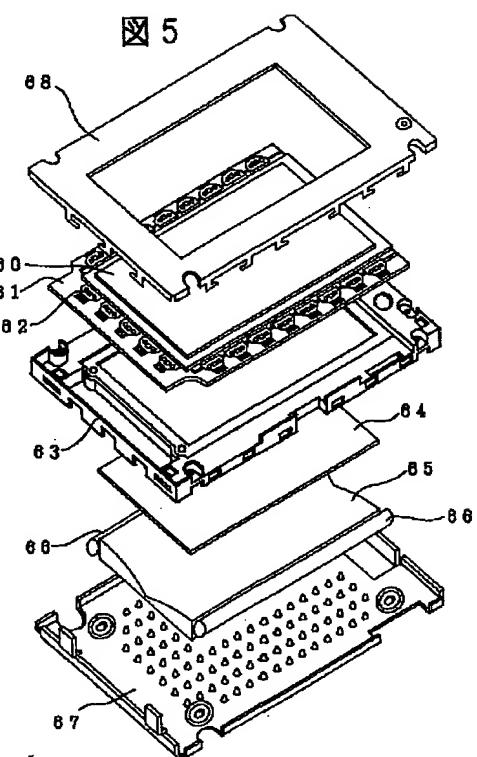
【図4】

図4



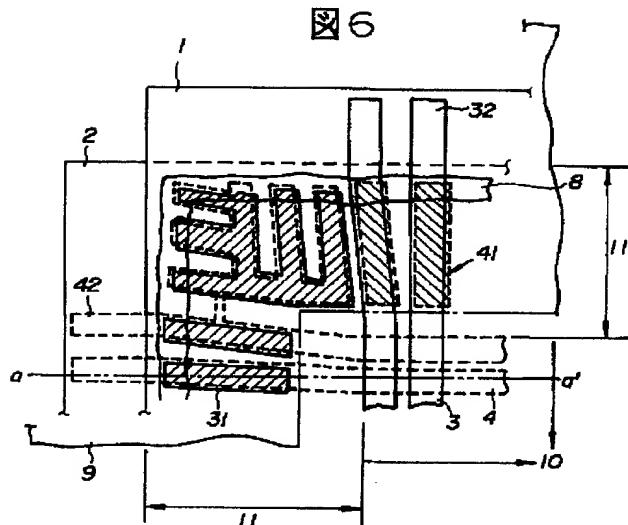
【図5】

図5

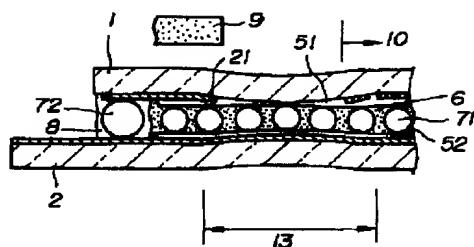


(7)

【図6】



【図8】



【手続補正書】

【提出日】平成5年11月9日

【手続補正 1】

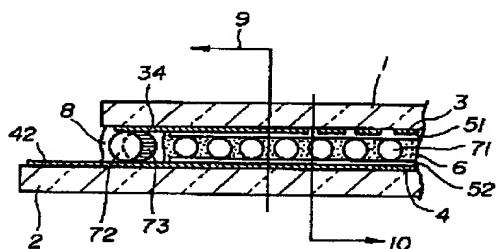
【補正対象書類名】 図面

【補正対象項目名】図2

【補正方法】麥更

【補正内容】

[図2]



【手續補正 2】

【補正対象書類名】 図面

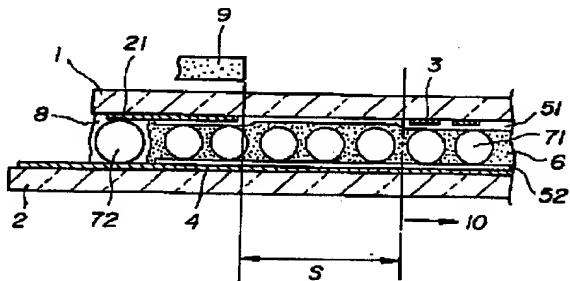
【補正対象項目名】図 7

【補正方法】麥更

【補正內容】

[図7]

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【手続補正3】

【補正対象書類名】 図面

【補正対象項目名】図8

【補正方法】変更

【補正內容】

[8]

